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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DUONG, KHANH B	
ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/617,107	BRIST ET AL.	
	Examiner	Art Unit	
	Khanh Duong	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,11 and 27-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,11 and 27-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This Office Action is in response to the Amendment filed on April 2, 2004.

Accordingly, claims 1-3, 11 and 28 were amended, and new claim 31 was added.

Currently, claims 1-5, 11 and 27-31 are pending in the application.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites the limitation "the first material" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim 31 is rejected as depending on the rejected base claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 11 and 27-30 are rejected under 35 U.S.C. 102(b) as being by Pan (US 4,983,250).

Re claims 1-3, 11 and 28, Pan discloses in Figs. 1-3 a method comprising: applying photo-thermal energy 20 (laser beam) to a layer 18 of first material (Ti, Cr, Ni or Si) disposed on a layer 16 of second material (Cu, Au, Al, Ag or Ni) to diffuse a portion of the first material 18 into the second material 16, wherein applying the photo-thermal energy 20 forms an electrically conductive trace 22, 24 [see col. 3, ln. 1 to col. 4, ln. 8]. Since Pan discloses the use of a short-pulse laser beam at 20 nsec to diffuse a portion of the first material 18 into the second material 16 [see col. 3, ln. 25-47], it should be inherent that such laser beam causes the first material 18 and the second material 16 to ablate into a plasma.

Re claims 27, Pan expressly discloses in Figs. 1 and 2 the first material 18 comprises a bottom surface and the first material 18 diffuses into the second material 16 such that an alloy 22, 24 is formed below the bottom surface of the first material 18.

Re claims 29, Pan discloses the laser 20 is provided to pattern a desired pattern of electrically conductive traces [see col. 3, ln. 25-27].

Re claims 30, Pan discloses in Fig. 3 removing non-diffused portions of the first material 18 [see col. 3, ln. 59-66].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Mori et al. (US 5,821,627).

Re claim 4, Pan discloses the second material includes copper but fails to disclose the first material includes tin and the electrically conductive trace includes a copper tin alloy.

Mori et al. ("Mori") suggests performing solid-phase diffusion bonding between two metals including copper and tin [see col. 9, ln. 5 to col. 10, ln. 64].

Since Pan and Mori are both from the same field of endeavor, the purpose disclosed by Pan would have been recognized in the pertinent prior art of Mori

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Pan by utilizing such materials as suggested by Mori, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pan.

Re claim 5, Pan discloses the process steps and elements previously as described, but fails to show the laser beam having a width between about 2 mils and about 8 mils.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a laser beam having the width as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Lee et al. (US 6,521,523).

Re claim 31, Pan discloses the metal layer comprises copper but fails to disclose the diffusion layer comprises at least one of an organic material, a polymer epoxy, or an organic metal.

Lee et al. ("Lee") suggests diffusing an aluminum organic material layer 212 into a copper layer 210 to form an aluminum copper alloy layer 212a, and eventually an aluminum oxide layer 212b [see FIG. 7; col. 5, ln. 6-32].

Since Pan and Lee are both from the same field of endeavor, the purpose disclosed by Lee would have been recognized in the pertinent prior art of Pan.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Pan by utilizing such materials as suggested by Lee, since Lee states at column 5, lines 33-35 that resultant aluminum oxide layer can function as a conventional sealing layer to prevent copper diffusion and oxidation.

Response to Arguments

Applicant's arguments filed September 20, 2004 have been fully considered but they are not persuasive.

Applicant argues that the Examiner's assertion that "it should be inherent that such laser beam causes the first material 18 and the second material 16 to ablate into plasma" is not supported by the Pan reference. In response, the Examiner respectfully disagrees because such inherency was based upon the extrinsic evidence that the Pan reference discloses the use of an excimer laser beam at 20 nsec to diffuse a portion of the first material 18 into the second material 16 [see col. 3, ln. 25-47]. To further clarify the inherency issue, Applicant is hereby requested to review U.S. Patent No. 4,966,887 to Garvey which discloses the use of a similar excimer laser beam at 20 nsec duration to produce a metal vapor plasma [see col. 4, ln. 8-14].

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on Monday - Thursday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KBD

AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
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